Kuznetsov K. S. (Saint-Petersburg, Russia) — **Weighted average price management of manufacturer realization on commodity exchanges with predetermined volume of sales.**

In this work it is offered a method for controlling the manufacturer's weighted average sales price on commodity exchanges. The urgency of the objective is to provide necessary hedging of manufacturer profit from a sharp drop in market prices. This study is based on the assumption that on the considered period of trading $[0, T]$ bargain prices x_t obeys the following stochastic differential equation

$$dx_t = c_t x_t dt + \sigma x_t dW_t$$

where c_t - coefficient of drift, W_t - standard Wiener process and σ - is a coefficient of volatility which is in turn a constant. The observable realization of stochastic process is denoted by the same symbol but only with the wave, for instance $\tilde{x}_t$. It is assumed that the unit price of a commodity during the time interval $[0, T]$ belongs to the price band $[x_{min}, x_{max}]$, i. e. $\tilde{x}_t \in [x_{min}, x_{max}]$ for $\forall t \in [0, T]$. The aim of the present study, which continues [1, 2], is to construct such function $\tilde{a}_t$, where $\tilde{a}_t$ is the volume of commodity sold on the time interval $[0, t]$, which would provide increase in the weighted averge price of manufacturer sales, when commodity prices are falling on spot markets. In addition, unlike the works [1, 2], we define the dependence of the quantity of goods sold at time T on the price x_T as follows:

$$\tilde{a}_T = A\tilde{x}_T + B$$

where $A = \frac{a_{max} - a_{min}}{x_{max} - x_{min}}$ and $B = -\frac{a_{max} - a_{min}}{x_{max} - x_{min}} x_{min} + a_{min}$. In this report it is proposed an approach in which producer of a commodity sells as much as possible at a price close to the upper limit x_{max} and buy back when goods are offered for a price close to the lower limit x_{min} during predetermined period of time $[0, T]$. The main result is as follows.

$$a_t = Ax_t + B + x_t A \frac{1}{\sigma^2 T} e^{\sigma^2 (T-t)} - x_t A \frac{1}{\sigma^2 T} - x_t A \frac{(T-t)}{T}$$

We will also discuss the conditions under which the weighted average sales price will increase and the impact of the presence of put options on the bargains volumes.

<div align="center">REFERENCES</div>

1. *Vavilov S. A., Kuznetsov K. S.* Weighted average price management of manufacturer sales on commodity exchanges. International Journal of Financial Engineering, 2018, vol. 05, №. 03, pp. 1-17.
2. *Vavilov S. A., Kuznetsov K. S.* Stochastic model to control the weighted average price of the manufacturer sales on commodity exchanges. Automation and Remote Control, 2019, № 6, pp. 142-155.